PRODUCT APPLICATION GUIDE | CONTROLS

DEMAND-CONTROLLED VENTILATION (CO_2 - BASED)

On Valent and Innovent units, the primary purpose of demand-controlled ventilation (DCV) is to save energy.

- This is achieved by reducing outdoor airflow to below the design ventilation rate when there are few or no occupants. Occupancy is estimated based on carbon dioxide levels measured by a CO_2 sensor located in the space or return air duct. A CO_2 value may also be provided to the unit controller by a building management system.
- The design ventilation rate combines two ventilation rates: the people outdoor air rate and the area outdoor air rate per ASHRAE 62.1 (Table 6.2.2.1 Minimum Ventilation Rates in Breathing Zones). When the CO_2 level is less than set point due to reduced or no occupancy, DCV may reduce the people outdoor air rate, but the area outdoor rate will remain the same.
- Therefore, DCV operates within a range where the minimum equals the area outdoor air rate and the maximum equals the design ventilation rate. See a graphed example of this in Figure 1 on the next page where the DCV range is 5–25%.
- **Important:** If the CO_2 level is above set point and the outdoor air damper is already open to the design ventilation rate, the high CO_2 level is likely due to exceeding design occupancy in the space. The unit controller will not open the outdoor air damper farther (because it may affect the ability to maintain the space heating or cooling set point) and the CO_2 level will not be reduced until occupancy is within design parameters.

TYPICAL APPLICATIONS

Spaces with large variations in occupancy, such as gymnasiums, ice rinks, theaters, meeting rooms, or classrooms

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EXAMPLE

- A Valent or Innovent unit with demand-controlled ventilation and airside economizer control
- Design ventilation rate = 25% outdoor air
- DCV outdoor air control ramp = 5–25%
- Economizer outdoor air control ramp = 0–100%
- The controller opens the outdoor air damper in response to the higher control ramp demand: DCV or economizer

Figure 1
Demand-Controlled Ventilation (DCV) and Economizer

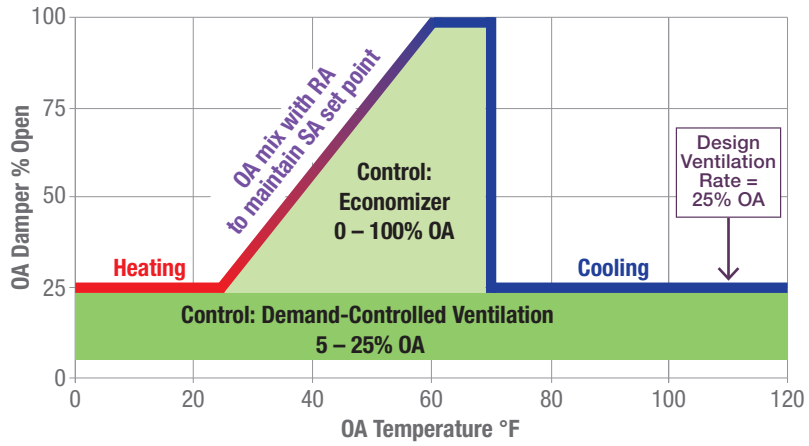

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Figure 1 Notes

- Economizer control modulates outdoor and recirculating air dampers to maintain unit supply air set point.
- On the graph when OA temperatures are 70 °F and greater, the OA damper is 25% open (design ventilation rate). At this point, both mechanical cooling and DCV are enabled, allowing the OA damper to modulate to less than the design ventilation rate when CO_2 levels are less than set point.
- When the OA temperature falls below the economizer-enable temperature (70 °F), the OA damper modulates to 100% open. Mechanical cooling remains enabled to maintain unit supply air temperature.
- As the OA temperature decreases below the unit supply air temperature set point, mechanical cooling is disabled and the OA damper begins to close to maintain unit supply air temperature, eventually modulating to 25% outdoor airflow, the design ventilation rate. At this point, heating and DCV are enabled, again allowing the OA damper to modulate to less than the design ventilation rate when CO_2 levels are less than set point.
- When the OA temperature increases, the process is reversed.